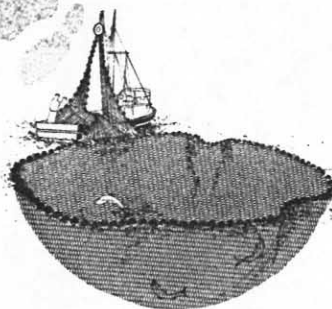
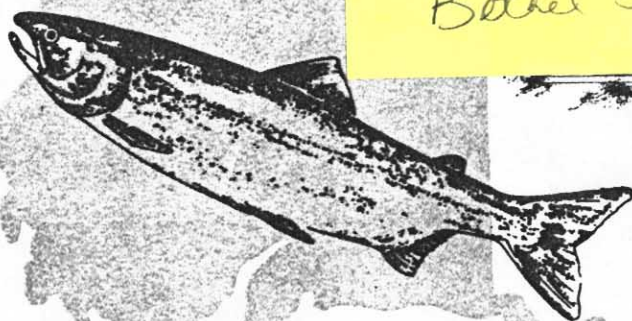
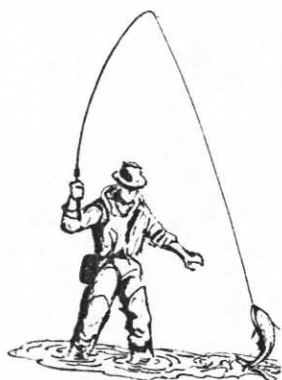


Alaska Fisheries Technical Report Number 15  
**FISHERY RESOURCES**  
**IN THE KISARALIK RIVER BASIN,**  
**YUKON DELTA NATIONAL WILDLIFE REFUGE,**  
**ALASKA, 1986**

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April 1992

Region 7

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FISHERY RESOURCES  
IN THE KISARALIK RIVER BASIN,  
YUKON DELTA NATIONAL WILDLIFE REFUGE, ALASKA, 1986

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## ABSTRACT

From June 9 to September 13, 1986, fishery resources of the Kisaralik River drainage basin were surveyed to: 1) determine species composition, relative abundance, and distribution of fish populations, 2) collect age, weight, and length data from specific fish species, 3) describe public boating and sport fishing use, and 4) identify and evaluate current and potential aquatic resource problems.

Ten of the fifteen species collected were salmonids and included six species of Pacific salmon: coho salmon *Oncorhynchus kisutch* (N=276), chinook salmon *O. tshawytscha* (N=98), chum salmon *O. keta* (N=33), rainbow trout *O. mykiss* (N=14), sockeye salmon *O. nerka* (N=13), and pink salmon *O. gorbuscha* (N=3). Other salmonids included 88 Dolly Varden *Salvelinus malma*, 39 Arctic grayling *Thymallus arcticus*, 38 round whitefish *Prosopium cylindraceum* and 11 lake trout *S. namaycush*. Non-salmonids included 50 slimy sculpin *Cottus cognatus*, 20 northern pike *Esox lucius*, 14 ninespine stickleback *Pungitius pungitius*, 4 longnose sucker *Catostomus catostomus*, and 2 Alaska blackfish *Dallia pectoralis*.

Range extensions of chinook, chum, coho and sockeye salmon were observed within the drainage and submitted to the Alaska Department of Fish and Game for inclusion into the Anadromous Stream Catalog.

Dolly Varden and Arctic grayling were the most abundant and widespread resident sport fish. Rainbow trout were less abundant and more restricted in range. Chinook and coho salmon were observed or captured throughout the drainage, whereas pink salmon were only captured in one of five river sections sampled.

Sport fishing effort and public use of the river was light with only 79 people observed during 15 surveys conducted by aircraft, river raft and jet boat trips. Only 19 (24%) of the people observed were sport fishing. An estimated 69 angler days of use occurred on the Kisaralik River in 1986, but this is considered a minimum estimate since an unknown number of anglers were not contacted during our surveys. Based on angler interviews, coho salmon were the most frequently captured species, followed by Arctic grayling, Dolly Varden, and rainbow trout.

Salmon populations appear to be depressed with less than 50 chinook and 200 adult chum salmon observed and only three adult pink salmon collected. Aerial surveys conducted by the Alaska Department of Fish and Game indicated that escapement was consistently below established goals during 16 surveys for chinook salmon and 17 surveys for chum salmon between 1960 and 1985. Aerial surveys are not conducted for pink, sockeye or coho salmon.

Commercial fishing is not allowed in the Kisaralik River, but in 1986, commercial and subsistence harvests in the lower Kuskokwim River were approximately 61,000 chinook and 400,000 chum salmon. To minimize harvests of depressed stocks such as Kisaralik River chinook and chum salmon, a multi-year study would be required to determine the abundance and run timing of the various stocks within the drainage.



on the diagonal from the anterior insertion of the anal fin to the posterior insertion of the dorsal fin. Impressions of adult scales were made on cellulose acetate cards and examined with a microfiche reader. Salmon ages are reported using the European Method (Koo 1962).

#### *Public Boating and Sport Fishing Use*

Public use was determined by conducting aerial surveys over the entire river, jet boat surveys while running to and from lower river sampling areas, and float surveys from the lakes downstream. The number of people seen on the river and their activities were recorded and used to calculate the percentage of people engaged in each activity.

Anglers encountered on the river were interviewed to determine the species and number of fish caught, harvested, or released, and the amount of fishing effort. Fishing effort for the entire season was determined by expanding the mean number of anglers per day by the total possible fishing time in the season (Neuhold and Lu 1957). Catch rates were calculated by dividing the total number of fish caught, harvested, and released by the number of hours fished.

#### *Aquatic Resource Problems*

Prior to the resource inventory, several aquatic resource problems were identified by local residents and refuge personnel. Reports of depressed salmon populations were evaluated by comparing inventory results with aerial survey index counts and visually observing the Upper Falls area to determine if it was a barrier to salmon migrating upstream. Reported excessive turbidity in Quicksilver Creek was evaluated by taking Secchi disk readings in the creek and adjacent river areas. Potential overharvest of rainbow trout was evaluated using age data and harvest rates.

## **RESULTS AND DISCUSSION**

#### *Relative Abundance and Distribution*

A total of 15 species was collected in the Kisaralik River (Table 2) including 10 species of salmonids. All species collected during this survey had been previously documented in the Kisaralik River (Alt 1978; Baxter 1982). However, Baxter (1982) collected eight species not observed during this survey. Failure to collect those species was probably due to limited sampling efforts rather than the absence of those species.

Both Alt (1978) and Baxter (1982) reported collecting Arctic char *S. alpinus* and neither reported collecting Dolly Varden. The two species are very similar and difficult to distinguish without meristic counts. Therefore, all the specimens collected in this survey were reported as Dolly Varden. Dolly Varden collected in headwater lakes and at Upper Falls displayed considerable differences in coloration from Dolly Varden

TABLE 2.—Scientific and common names of the fish species found in the Kisaralik River, Yukon Delta National Wildlife Refuge, Alaska.

Scientific name	Common name
<i>Lampetra japonica</i> <sup>a</sup>	Arctic lamprey
<i>Coregonus nasus</i> <sup>a</sup>	broad whitefish
<i>Coregonus pidschian</i> <sup>a</sup>	humpback whitefish
<i>Coregonus sardinella</i> <sup>a</sup>	least cisco
<i>Oncorhynchus gorbuscha</i>	pink salmon
<i>Oncorhynchus keta</i>	chum salmon
<i>Oncorhynchus kisutch</i>	coho salmon
<i>Oncorhynchus mykiss</i>	rainbow trout
<i>Oncorhynchus nerka</i>	sockeye salmon
<i>Oncorhynchus tshawytscha</i>	chinook salmon
<i>Prosopium cylindraceum</i>	round whitefish
<i>Salvelinus alpinus</i> <sup>a</sup>	Arctic char
<i>Salvelinus malma</i>	Dolly Varden
<i>Salvelinus namaycush</i>	lake trout
<i>Stenodus leucichthys</i> <sup>a</sup>	sheefish
<i>Thymallus arcticus</i>	Arctic grayling
<i>Hypomesus olidus</i> <sup>a</sup>	pond smelt
<i>Dallia pectoralis</i>	Alaska blackfish
<i>Esox lucius</i>	northern pike
<i>Catostomus catostomus</i>	longnose sucker
<i>Lota lota</i> <sup>a</sup>	burbot
<i>Pungitius pungitius</i>	ninespine stickleback
<i>Cottus cognatus</i>	slimy sculpin

<sup>a</sup> Species not found in this study, but documented by Baxter (1982).



collected elsewhere in the Kisaralik River. The differences in coloration could be due to several possible situations: the presence of both resident and anadromous forms of Dolly Varden, the presence of both Dolly Varden and Arctic char, or differences in sexual maturity. Neither Alt (1978) nor Baxter (1982) reported observing coloration differences in Arctic char.

*Resident fish*—Dolly Varden (N=88), slimy sculpin (N=50), Arctic grayling (N=39) and round whitefish (N=38) were the most abundant resident species captured. Northern pike, rainbow trout, lake trout, ninespine stickleback, longnose sucker, and Alaska blackfish were also captured but numbered 20 or less. Dolly Varden were the most widely distributed resident species and were collected in every major study section (Table 3) including the headwater lakes. Rainbow trout were collected only in river sections III and IV although Section II appeared to provide good rainbow trout habitat. Section V did not appear to offer good rainbow trout habitat but may be an adult overwintering area or juvenile rearing area. Lake trout were collected only in the headwater lakes. Northern pike, round whitefish, longnose sucker, ninespine stickleback, and Alaska blackfish were collected only in Section V.

Arctic grayling were collected in sections III, IV, and V. Previous surveys by Alt (1978) and Baxter (1982) documented Arctic grayling in Kisaralik Lake (Section I) and Baxter (1982) collected them in the river above Golden Gate Falls (Section II). Baxter (1982) also collected round whitefish in Kisaralik and North Fork lakes as well as in the river above Golden Gate Falls. Failure to collect Arctic grayling and round whitefish in these areas during this survey was probably due to limited sampling effort.

*Salmon*—Five species of salmon were captured with coho (N=276) and chinook salmon (N=98) predominant in our catches. Salmon were widely distributed throughout the Kisaralik River except for pink salmon, which were only observed in Section IV (Table 3). Chinook and coho salmon were observed throughout the river including Section I (Table 3). Sockeye were observed spawning in Section IV and in Gold Creek (Section I). Sockeye salmon fry were only collected in Section V (Table 3). Chum salmon were observed from Section V upstream into Section II above Golden Gate Falls; none were observed at or above Upper Falls. Most chum salmon were observed in the slower side channels of the braids where partially eaten carcasses were observed along the banks.

Chinook salmon were first observed in the river in early July. High and turbid water hampered efforts to determine spawning times and sites, but ripe adults were sampled before, and carcasses were sampled after the normal July 15 to August 10 spawning period (D. Schneiderhan, Alaska Department of Fish and Game, personal communication). A few chum salmon were found spawning as early as July 18 while others had not spawned by August 16. Coho salmon were first observed in the river in early August. Coho salmon observed as late as September 13 had not commenced

TABLE 3.—Occurrence of adult (A) and juvenile (J) fishes sampled in five study areas of the Kisaralik River, Yukon Delta National Wildlife Refuge, Alaska, 1986 (P = present but not sampled, C = carcasses observed).

Species	River section									
	V		IV		III		II		I	
	A	J	A	J	A	J	A	J	A	J
Chinook salmon	1	7	P	45	6	39	C		C	
Chum salmon	4	9	20		P		P			
Coho salmon		118	42	65	6	30	11		4	P
Sockeye salmon		8	3		P				2	
Pink salmon			3							
Rainbow trout			10		4					
Dolly Varden		2	6	34	7	8	13	P	6	12
Arctic grayling	2		7		30					
Lake trout									11	
Northern pike	20									
Round whitefish	9	29								
Longnose sucker		4								
Slimy sculpin	34				5				11	
Ninespine stickleback	14									
Alaska blackfish		2								



spawning, indicating that the spawning period for this species probably extends into late September or early October. Very few sockeye salmon were observed during our surveys and only five adults were collected (Table 3). The earliest observation of sockeye salmon was in mid-August and two additional sockeye salmon were seen in late August. Sockeye salmon are not common in the Kisaralik River and were not reported in the system before 1981 (Baxter 1981).

Only three pink salmon were observed, which occurred on August 14-15. Alt (1978) and Kavanaugh (U.S. Department of Interior 1976) reported seeing pink salmon running in even years. Baxter (1981) estimated seeing more than 10,000 chum and pink salmon spawning in the area between Golden Gate Falls and the mouth in 1980. Baxter did not state the proportion of each species in his estimate but, unless pink salmon were a very small percentage, it appears that the pink salmon population in the Kisaralik River has declined.

Several range extensions of salmon in the Kisaralik River were documented during the survey and nominated for inclusion in the Alaska Department of Fish and Game Anadromous Stream Catalog (Table 4). The extensions are chinook, coho, sockeye, and chum salmon rearing and migration habitats in Gold and Quartz creeks and downstream of the outlets of North Fork and Kisaralik lakes.

TABLE 4.—Range extensions of salmon nominated to the Alaska Department of Fish and Game Anadromous Stream Catalog, Kisaralik River drainage, Alaska, 1986.

Species	Date	Rearing	Migration	Location
Chinook salmon	7/17/86	X		Lower 100 m of Quartz Creek
Chinook salmon	7/17/86		X	Lower 2 km of Quartz Creek
Chum salmon	7/17/86		X	Lower 2 km of Quartz Creek
Coho salmon	9/6/86		X	2 km below outlet of Kisaralik Lake
Coho salmon	8/19/86	X		Outlet of Upper North Fork Lake
Coho salmon	7/17/86	X		Lower 100 m of Quartz Creek
Coho salmon	9/8/86		X	Lower 2 km of Quartz Creek
Sockeye salmon	8/20/86		X	Gold Creek, 5 km below Gold Lake



### Age, Weight, and Length

**Resident fish**—Of the five resident sport fish species captured during the survey, the only juvenile fish captured were Dolly Varden. Juvenile Dolly Varden ( $N=56$ ) ranged in length from 32-146 mm (mean=62,  $SD=28$ ). The range and mean lengths and weights of adult resident fish are presented in Table 5. Ages were not determined for Dolly Varden. Adult Dolly Varden collected in the headwater lakes and at Upper Falls had two distinct sizes of reproductive organs suggesting non-consecutive year spawning ( $N=6$ ).

The smallest rainbow trout was 325 mm long and 5 years old. Age groups 5, 6, 7, 8, 9, and 11 were represented ( $N=12$ ). Two larger rainbow trout, 580 and 490 mm, were caught by anglers but were not included in Table 5 because of evisceration. No juvenile rainbow trout were collected. This is consistent with Alt's (1977) inventory in which no young-of-the-year and only 5 rainbow trout in the 96-180 mm range were captured. A three year investigation of the Kanektok River rainbow trout (1985-1987) captured no young-of-the-year and a total of one age 1 fish, four age 2 fish, and 38 age 3 fish (Wagner 1991).

Some of the rainbow trout sampled had red slashes typical of cutthroat trout *O. clarkii* on the underside of the jaw. Alt (1978) found this in Aniak River rainbow trout and Scott and Crossman (1973) indicated it sometimes occurs in rainbow trout. The Kisaralik River is not within the range of anadromous rainbow trout (Morrow 1980).

Ages of lake trout ranged from 4 to 8 years ( $N=9$ ). Two sizes of eggs suggested non-consecutive year spawning ( $N=4$ ). No juvenile lake trout were caught in minnow traps or fine mesh gill nets.

TABLE 5.—Mean lengths and weights of adult resident fish in the Kisaralik River, Yukon Delta National Wildlife Refuge, Alaska, 1986.

Species	N	Length (mm)			Weight (g)		
		Mean	SD	Range	Mean	SD	Range
Dolly Varden	32	436	89	370-555	775	426	420-2,075
Rainbow trout	12	428	49	325-480	838	275	340-1,200
Lake trout	11	506	30	470-560	1,346	286	940-1,850
Northern pike	20	405	90	225-570	498	309	60-1,200
Arctic grayling	33	330	49	230-430	357	156	120-740